ASSESSING THE EVACUATION CAPACITY OF RURAL COMMUNITIES HIGHLY EXPOSED TO TSUNAMI HAZARD

A CASE STUDY OF WAIRARAPA COASTAL COMMUNITIES

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Context

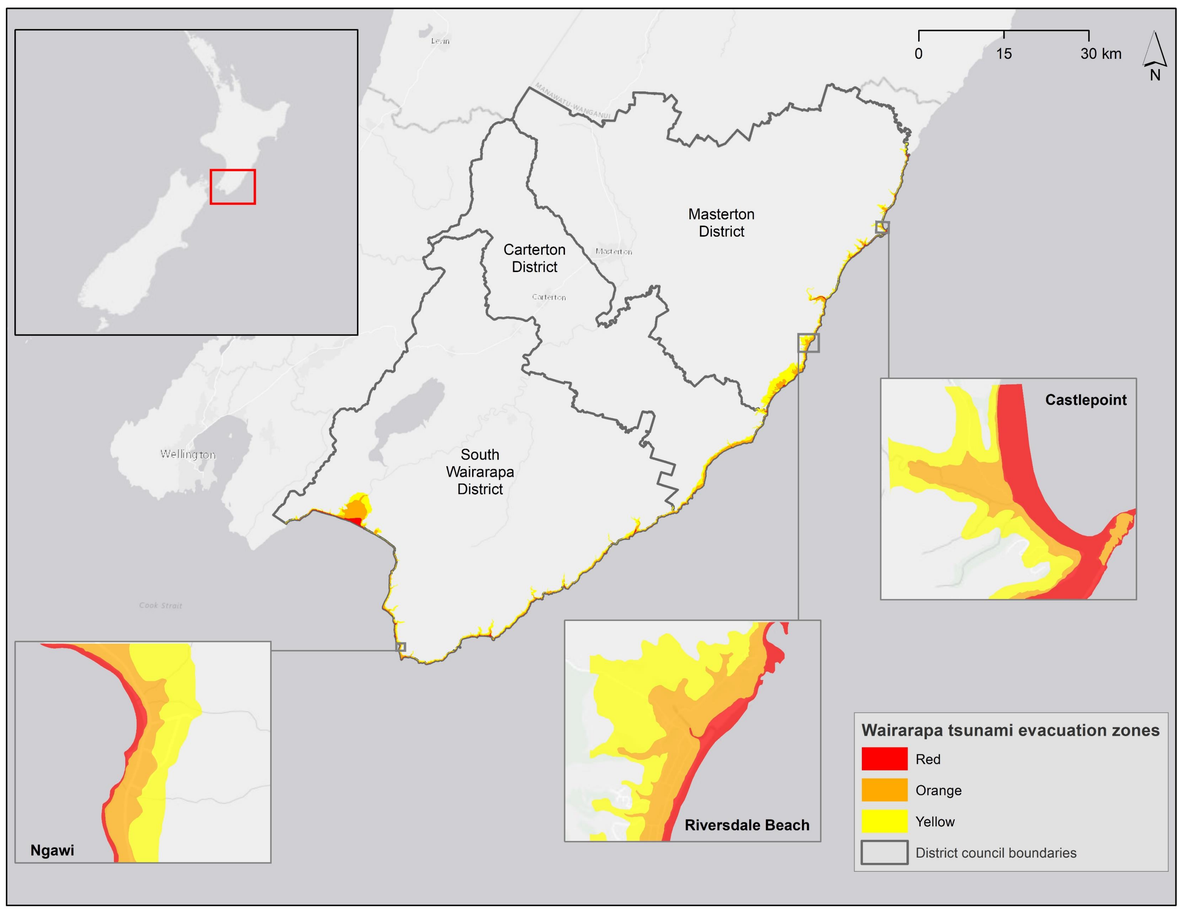
1 Wairarapa is one of the most highly exposed areas to tsunami in New Zealand, primarily due to proximity to a significant local source for large earthquakes, the Hikurangi subduction zone.

2 Due to its low population density almost no detailed research has been undertaken to date regarding tsunami hazard and risk to Wairarapa.

3 A preliminary study by Evans (2020) highlights the very high tsunami risk in Wairarapa, particularly in Riversdale Beach, Castlepoint and Ngawi coastal communities (GWRC, 2004).

4 Given that the warning time for a local source tsunami could be <30 minutes (Fraser et al., 2014), evacuation modelling in Evans (2020) shows a scenario where the evacuation is unsuccessful.

Study area: Wairarapa



Wairarapa tsunami evacuation zones obtained from publicly available data provided by Greater Wellington Regional Council (GWRC) via ArcGIS Online. The zones were developed by GNS Science for GWRC and Horizons regions and defined by a GIS-calculated attenuation rule (Leonard et al., 2008).
Basemap credits: Land Information New Zealand, Eagle, Esri, HERE, Garmin and OpenStreetMap contributors and the GIS user community.

Methodology

Review

Objective 1: Identify the tsunami hazard, risk and risk management strategies for Wairarapa in a local, national and international context.
Objective 2: Compare evacuation modelling approaches used in previous related studies.

Engagement

Key engagement with stakeholders
WREMO East Coast Lab
GNS Science GWRC
Wairarapa coastal communities

Survey

Objective 3: Increase understanding of tsunami awareness and preparedness in Wairarapa rural communities.
- Surveys distributed in January 2021.

Modelling

Objective 4: Develop an evacuation model to assess evacuation time and potential challenges for current tsunami evacuation procedures for three rural coastal communities in Wairarapa.

Preliminary research findings

1. Winter night evacuation
Population = Usual residents
Number of safe zones used = 3/3
Total evacuation time = 9 minutes

2. Summer night evacuation
Population = Usual residents & maximum visitors
Number of safe zones used = 3/3
Total evacuation time = 110 minutes

3. Summer night evacuation using only exit road
Population = Usual residents & maximum visitors
Number of safe zones used = 1/3
Total evacuation time = Not feasible to calculate

References

Fraser, S. A., Power, W. L., Wang, X., Wallace, L. M., Mueller, C., & Johnston, D. M. (2014). Tsunami inundation in Napier, New Zealand, due to local earthquake sources. *Natural Hazards, 70,* 415-445. DOI: 10.1007/s11069-013-0820-x
Evans, A. (2020). Tsunami exposure assessment of population, buildings and critical infrastructure informing a vehicular evacuation model for Riversdale Beach in Wairarapa, New Zealand [Unpublished Master's Dissertation]. University of Canterbury.
Greater Wellington Regional Council. (2004). *Coastal hazards in the Wairarapa.* http://www.gw.govt.nz/assets/council-hazards/2150_Coastalhazardsin_s4116.pdf
Leonard, G. S., Lukovic, B., Langridge, R., Downes, G., Power, W., Smith, W., Johnston, D. (2008). Interim tsunami evacuation planning zone boundary mapping for the Wellington and Horizons regions defined by a GIS-calculated attenuation rule. *GNS Science Report 2008/30*. 22p.